Preface to the special issue on Phase Equilibria in Oxide Systems

Rapid development of materials science for various oxides that had started in the middle of XX century because of their application as semiconductors, catalysts, ferroelectrics, materials for various electrochemical devices, and so on, aroused a number of challenging issues for researchers and engineers concerning preparation, application and properties of oxide materials. It is generally recognized that knowledge of phase equilibria is a fundamental physicochemical basis for the preparation and usage of any materials, including oxides. Temperature, oxygen partial pressure and molar ratio of components significantly influence the phase composition, crystal and defect structure, and as a result, functional properties of oxide materials.

One of the most convenient ways for graphical presentation of phase equilibria since the Gibbs' times is phase diagrams. Great efforts all over the world were undertaken for construction of phase diagrams for binary and more complex systems. It's worth to notice that experimental construction of phase diagrams is time consuming and complicated task, especially if one would like to study a multicomponent system. In order to facilitate this task, serious efforts have been undertaken towards developing theoretical methods for constructing phase diagrams. Significant progress in obtaining reliable data for various oxide systems has been reached employing so-called computer assessment, which uses all available information for a particular system.

Up-to-date precise methods of investigation of solids, like neutron diffraction, electron diffraction, high resolution transmission electron microscopy (HRTEM), electron energy loss spectroscopy (EELS), and some others allow revealing a formation of superstructures, fine order ↔ disorder type transformations, intergrowth effects and surface phenomena.

The present special issue is devoted to various aspects of phase equilibria in oxide systems and includes the papers containing the results of original research on the selected oxide systems, the overview of the experimental studies of the wide family of oxide systems, presentation of the existing approaches for theoretical evaluation of phase equilibria in oxide systems as well as the results of fine effects' observation involving surface phase formation.